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10/710,881	08/10/2004	Thomas R. Frederiksen JR.	OPT-009	4880

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EXAMINER	
PHAN, HANH	
ART UNIT	PAPER NUMBER
2613	
MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/710,881	Applicant(s) FREDERIKSEN ET AL.	
	Examiner Hanh Phan	Art Unit 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 April 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12,14,16-23,25,27-32,34 and 35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12, 14, 16-23, 25, 27-32, 34 and 35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is responsive to the Amendment filed on 04/27/2008.

2. The indicated allowability of claims 112, 14, 16-23, 25, 27-32, 34 and 35 are is withdrawn in view of the newly discovered reference(s) to Zhou (Pub. No.: US 2004/0052536) and Pidgeon, Jr. (US Patent No. 6,204,718). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-11, 14, 16-22, 25, 27-31, 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (US Patent No. 6,985,020) in view of Pidgeon, Jr. (US Patent No. 6,204,718) **OR** Zhou (Pub. No.: US 2004/0052536).

Regarding claim 1, referring to Figures 7 and 10-12, Zhou teaches an integrated laser device comprising:

a pre-distortion circuit (i.e., predistortion circuit 300, Fig. 7) having an input (i.e., RF input, Fig. 7) that receives an electrical modulation signal, the pre-distortion circuit (i.e., predistortion circuit 300, Fig. 7) generating a pre-distorted modulation signal at an

output from the electrical modulation signal (i.e., col. 6, lines 10-67 and col. 7, lines 1-50); and

a laser (i.e., laser diode D303, Fig. 7) that is integral with the pre-distortion circuit (i.e., predistortion circuit 300, Fig. 7), the laser (i.e., laser diode D303, Fig. 7) having an electrical modulation input that is connected to the output of the pre-distortion circuit (i.e., predistortion circuit 300, Fig. 7), the laser modulating an optical signal with the pre-distorted modulation signal, wherein the pre-distorted modulation signal causes at least some vector cancellation of distortion signals generated when the laser modulates the optical signal (i.e., col. 6, lines 10-67, col. 7, lines 1-50, col. 8, lines 10-67, col. 9, lines 1-67 and col. 10, lines 1-19).

Zhou differs from claim 1 in that he fails to specifically teach the laser is integral with and in close proximity to the pre-distortion circuit in a single device package and an input impedance of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit. Pidgeon, Jr., from the same field of endeavor likewise teaches a laser device (Figures 2a, 2b, 3 and 4a). Pidgeon, Jr. further teaches the laser is integral with and in close proximity to the pre-distortion circuit in a single device package and an input impedance of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit (i.e., Figs. 2a, 2b, 3 and 4a, col. 4, lines 28-67, col. 5, lines 1-8, col. 6, lines 61-67 and col. 7, lines 1-67) **OR** Zhou, from the same field of endeavor likewise teaches a laser device (Figures 2-8). Zhou further teaches the laser is integral with and in close proximity to the pre-distortion circuit in a single device package and an input impedance

of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit (i.e., Figs. 2-8, pages 2 and 3, paragraphs [0020]-[0041]). Based on this teaching, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the laser is integral with and in close proximity to the pre-distortion circuit in a single device package and an input impedance of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit as taught by Pidgeon, Jr. **OR** Zhou in the system of Zhou. One of ordinary skill in the art would have been motivated to do this since allowing reducing the distortion of the signal, reducing size, space, weight, power consumption and cost of the whole system.

Regarding claim 2, Zhou further teaches the pre-distortion circuit (i.e., predistortion circuit 300, Fig. 7) comprises a shunt-type pre-distortion circuit (i.e., col. 4, line 48-67, col. 5, lines 1-14, col. 6, lines 10-67 and col. 7, lines 1-50).

Regarding claims 3 and 33, Zhou further teaches the shunt-type pre-distortion circuit comprises a non-linear electronic device (i.e., diodes 301 and 302, Fig. 7, col. 6, lines 10-67 and col. 7, lines 1-50).

Regarding claim 4, Zhou further teaches the shunt-type type pre-distortion circuit (i.e., predistortion circuit 300, Fig. 7) comprises a semiconductor diode (i.e., diodes 301 and 302, Fig. 7, col. 6, lines 10-67 and col. 7, lines 1-50).

Regarding claim 5, Zhou further teaches the pre-distortion circuit comprises a first and a second shunt-type pre-distortion circuit (i.e., Fig. 11, the pre-distortion circuit

comprises a first and a second shunt-type pre-distortion circuit 200 and 300, col. 8, lines 10-67, col. 9, lines 1-67 and col. 10, lines 1-19).

Regarding claim 6, Zhou further teaches the pre-distortion circuit (i.e., predistortion circuit 300, Fig. 7) generates a pre-distorted modulation signal that reduces an amplitude of third-order distortion signals that are generated when the laser modulates the optical signal (i.e., col. 6, lines 10-67 and col. 7, lines 1-50).

Regarding claim 7, Zhou further teaches the pre-distortion circuit (i.e., predistortion circuit 300, Fig. 7) generates a pre-distorted modulation signal that reduces an amplitude of second-order distortion signals that are generated when the laser modulates the optical signal (i.e., col. 6, lines 10-67 and col. 7, lines 1-50).

Regarding claim 8, Zhou further teaches the pre-distortion circuit (i.e., predistortion circuit 300, Fig. 7) generates a pre-distorted modulation signal that reduces an amplitude of temperature dependent distortion signals that are generated when the laser modulates the optical signal (i.e., col. 6, lines 10-67 and col. 7, lines 1-50).

Regarding claims 9 and 30, the combination of Zhou and Pidgeon, Jr. **OR** Zhou teaches the pre-distortion circuit generates a pre-distorted modulation signal that reduces temperature dependent distortion signals that are generated by the pre-distortion circuit (i.e., Figs. 2a, 2b, 3 and 4a of Pidgeon, Jr., col. 4, lines 28-67, col. 5, lines 1-8, col. 6, lines 61-67 and col. 7, lines 1-67).

Regarding claims 10 and 34, Zhou further teaches the pre-distortion circuit (i.e., predistortion circuit 300, Fig. 7) comprises a bias input (i.e., Vbias input 310, Fig. 7) that

receives a bias signal that controls the vector cancellation of distortion signals generated when the laser modulates the optical signal (i.e., col. 6, lines 10-67 and col. 7, lines 1-50).

Regarding claims 11, 22 and 31, Zhou further teaches the laser (i.e., laser diode D303, Fig. 3, Fig. 7) comprises a distributed feedback laser (i.e., col. 4, line 48-67, col. 5, lines 1-14, col. 6, lines 10-67 and col. 7, lines 1-50).

Regarding claims 14 and 25, the combination of Zhou and Pidgeon, Jr. **OR** Zhou teaches the integral laser and pre-distortion circuit are fabricated on a single monolithic substrate (i.e., Figs. 2a, 2b, 3 and 4a, col. 4, lines 28-67, col. 5, lines 1-8, col. 6, lines 61-67 and col. 7, lines 1-67).

Regarding claim 16, Zhou further teaches an output impedance of an amplifier (i.e., amplifier 401, Fig. 11) that amplifies the electrical modulation signal is substantially matched to an input impedance of the pre-distortion circuit (i.e., predistortion circuit 200 and 300, Fig. 11, col. 8, lines 10-67, col. 9, lines 1-67 and col. 10, lines 1-19).

Regarding claim 17, Zhou further teaches the pre-distortion circuit (i.e., predistortion circuit 300, Fig. 7) generates the pre-distorted modulation signal by generating a pre-distortion signal and combining the pre-distortion signal with the electrical modulation signal (i.e., col. 4, line 48-67, col. 5, lines 1-14, col. 6, lines 10-67 and col. 7, lines 1-50).

Regarding claims 18 and 27, Zhou further teaches the pre-distorted modulation signal causes vector cancellation of substantially all distortion signals generated when

the laser modulates the optical signal (i.e., Fig. 7, col. 4, line 48-67, col. 5, lines 1-14, col. 6, lines 10-67 and col. 7, lines 1-50).

Regarding claims 19 and 28, Zhou teaches further comprising an integral transmission line that couples the output of the pre-distortion circuit to the electrical modulation input of the laser, the integral transmission line substantially maintaining an amplitude and a phase response of the pre-distorted modulation signal (i.e., Fig. 7, col. 4, line 48-67, col. 5, lines 1-14, col. 6, lines 10-67 and col. 7, lines 1-50).

Regarding claims 20, 29 and 35, referring to Figures 7, 10 and 11, Zhou teaches an optical source (i.e., an optical source comprises an amplifier 401, predistortion circuit 200 and 300 and a laser diode D303, Figs. 7, 10 and 11) having reduced second-order and third-order distortions, the optical source comprising:

a pre-distortion circuit (i.e., predistortion circuit 200 and 300, Figs. 7, 10 and 11) having a modulation signal input that receives an electrical modulation signal, a first bias input (i.e., a first bias input 216 of predistorion circuit 200, Figs. 10 and 11) that receives a first bias signal, and a second bias input (i.e., a second bias input 310 for predistortion circuit 300, Figs. 7 and 11) that receives a second bias signal, the pre-distortion circuit (i.e., predistortion circuit 200 and 300, Figs. 7, 10 and 11) generating a pre-distorted modulation signal at an output from the electrical modulation signal, the first bias signal, and the second bias signal (i.e., col. 6, lines 10-67, col. 7, lines 1-50, col. 8, lines 10-67, col. 9, lines 1-67 and col. 10, lines 1-19); and

a laser (i.e., laser diode D303, Figs. 7 and 11) that is integral with the pre-distortion circuit, the laser having an electrical modulation input that is connected to the

output of the pre-distortion circuit, the laser modulating an optical signal with the pre-distorted modulation signal, wherein the pre-distorted modulation signal causes at least some vector cancellation of second-order distortion signals generated when the laser modulates the optical signal in response to the first bias signal and causes at least some vector cancellation of third-order distortion signals generated when the laser modulates the optical signal in response to the second bias signal (i.e., col. 6, lines 10-67, col. 7, lines 1-50, col. 8, lines 10-67, col. 9, lines 1-67 and col. 10, lines 1-19).

Zhou differs from claims 20, 29 and 35 in that he fails to specifically teach the laser is integral with and in close proximity to the pre-distortion circuit in a single device package and an input impedance of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit. Pidgeon, Jr., from the same field of endeavor likewise teaches a laser device (Figures 2a, 2b, 3 and 4a). Pidgeon, Jr. further teaches the laser is integral with and in close proximity to the pre-distortion circuit in a single device package and an input impedance of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit (i.e., Figs. 2a, 2b, 3 and 4a, col. 4, lines 28-67, col. 5, lines 1-8, col. 6, lines 61-67 and col. 7, lines 1-67) **OR** Zhou, from the same field of endeavor likewise teaches a laser device (Figures 2-8). Zhou further teaches the laser is integral with and in close proximity to the pre-distortion circuit in a single device package and an input impedance of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit (i.e., Figs. 2-8, pages 2 and 3, paragraphs [0020]-[0041]). Based on this teaching, it would have been obvious to one having skill in

the art at the time the invention was made to incorporate the laser is integral with and in close proximity to the pre-distortion circuit in a single device package and an input impedance of the electrical modulation input of the laser is substantially matched to an output impedance of the pre-distortion circuit as taught by Pidgeon, Jr. **OR** Zhou in the system of Zhou. One of ordinary skill in the art would have been motivated to do this since allowing reducing the distortion of the signal, reducing size, space, weight, power consumption and cost of the whole system.

Regarding claim 21, Zhou further teaches the pre-distortion circuit (i.e., predistortion circuit 200 and 300, Figs. 7, 10 and 11) comprises a first shunt-type pre-distortion circuit having the first bias input that receives the first bias signal and a second shunt-type pre-distortion circuit having the second bias input that received the second bias signal (i.e., col. 6, lines 10-67, col. 7, lines 1-50, col. 8, lines 10-67, col. 9, lines 1-67 and col. 10, lines 1-19).

5. Claims 12, 23 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou (US Patent No. 6,985,020) in view of Pidgeon, Jr. (US Patent No. 6,204,718) **OR** Zhou (Pub. No.: US 2004/0052536) and further in view of Wilson (US patent No. 6,917,764).

Regarding claims 12, 23 and 32, the combination of Zhou and Pidgeon, Jr. **OR** Zhou differs from claims 12, 23 and 32 in that it fails to specifically teach the laser comprises an electro-absorption modulated laser. Wilson, from the same field of endeavor likewise teaches predistortion circuit with combined odd-order and even order correction (Figures 2 and 4-8). Wilson further teaches the laser comprises an electro-

absorption modulated laser (i.e., laser 28 output is modulated by the electroabsorption (EA) modulator 30, Fig. 2, col. 4, lines 29-67, col. 5, lines 1-67 and col. 6, lines 1-8). Based on this teaching, it would have been obvious to one having skill in the art at the time the invention was made to incorporate the laser comprises an electro-absorption modulated laser as taught by Wilson in the system of the combination of Zhou and Pidgeon, Jr. **OR** Zhou. One of ordinary skill in the art would have been motivate to do this since allowing compensating for the signal distortion.

Response to Arguments

6. Applicant's arguments with respect to claims 1-12, 14, 16-23, 25, 27-32, 34 and 35 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanh Phan whose telephone number is (571)272-3035.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan, can be reached on (571)272-3022. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-4700.

/Hanh Phan/

Primary Examiner, Art Unit 2613